

1884

KENTUCKY GEOLOGICAL SURVEY
AND BUREAU OF IMMIGRATION.

JOHN R. PROCTER, Director.

REPORT
ON THE
PROGRESS OF THE SURVEY
FROM JANUARY, 1882, TO JANUARY, 1884.

By JOHN R. PROCTER.

FRANKFORT, KY.:
PRINTED AT THE KENTUCKY YEOMAN OFFICE.
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To His Excellency, J. PROCTOR KNOTT,

Governor of the Commonwealth of Kentucky:

SIR: I have the honor to make the following report on the progress of the Geological Survey of the State:

In assuming the direction of the Survey, I believed that the most advantageous results for the expenditure of money would be obtained by an adherence to the following plans in the prosecution of the work:

(1.) A topographical and geological survey of the two coal fields of the State; obtaining information of the area, thickness, position, character, and quality of the various strata of coal and iron ores, clays, etc.; studying the relation of same to available transportation routes, and also with existing resources in adjacent States; also a study of the kinds, quality, and distribution of the timbers; the water powers; the character of the soils, and the adaptability of these soils to certain branches of agriculture, and the suitableness of the same for immigration; to make the above known to the world by carefully prepared and accurate statements of facts.

(2.) The making of such a survey of the various counties of the State as will best promote agricultural development: the analyses of the soils, sub-soils, and under-clays of the various geological horizons, the coloring of these horizons on the map, in a manner to enable the agriculturist to make practical use of the results obtained. This work I believe to be of fundamental importance, affecting, as it does, the well-being and prosperity of a large majority of our people.

(3.) In connection with the above, the chemical and laboratory work; analyses of soils, clays, coals, iron ores, mineral waters, and other substances collected by the Geological Survey; the practical testing of the coking quality of coals, and testing of clays, etc.

(4.) Topographical work: the making of county maps, and coloring the geology on the same; the completion of an accurate map of the State. The necessity for a correct map of Kentucky cannot be over-estimated, none having ever been made.

(5.) The collection, in the State Cabinet, of specimens of the coals, iron ores, building stones, clays, and other substances, showing the resources of the State. Also a collection of the fossil remains from the various strata, and the arrangement and classification of the same in a manner best calculated to afford instruction to persons wishing to gain information on such subjects.

(6) The office work: preparation of reports for publication; reading of proof; preparation of geological sections and illustrations; drawing of maps and coloring same; conduct of the large correspondence of the Survey, etc.

(7) Work connected with the Bureau of Immigration, placed by law under the Geological Survey.

With the above statement of the objects of the Survey and the subdivisions of the work, I will give, as briefly as may be consistent with a proper explanation, the progress and results.

(I.) SURVEY OF THE COAL FIELDS.

The limitations imposed by the smallness of the appropriation available for this work rendered it impossible to give to the several parts of the State the attention which the value of the resources seemed to warrant, and it was deemed proper to concentrate the work where it would produce the most beneficial results to the entire State. The work begun under the direction of Prof. A. R. Crandall in the southeastern portion of the State, in the summer of 1881, was so fruitful in good results that it was decided to push it to completion. The region drained by the upper waters of the Big Sandy, Licking, Kentucky, and Cumberland rivers is the largest area in the State unpenetrated by railways. The counties comprising this region are but sparsely populated, and are, for this reason, unable to construct the necessary transportation ways to connect them with the commercial world. It was believed that the making known the abundant resources of this region would lead to the construction of the much needed railways, and insure the rapid development of this neglected portion of our Commonwealth. In the summer of 1881 the Survey discovered a very thick coal of great purity, and tests in the laboratory indicated that it was a coking coal of superior excellence. During the summers and autumns of 1882 and 1883, the party in charge of Prof. Crandall was engaged in tracing this coal, determining its area and thickness, and making practical tests of its coking properties. These results will be shown in the forthcoming report on the geology of that region. The following facts have been established. This coal, which has been named for convenience of reference the "Elkhorn Coking Coal," has been identified and traced over a large area on the head waters of the streams above mentioned, where it is found to be from eight feet to nine feet thick, with conditions favorable for cheap mining. On the outer rim of the basin of thickest coal

the same coal is found extending over a considerable area, with a thickness of from four feet to eight feet. It is hoped to extend the known area of this valuable coal during the coming summer. Mr. R. C. Ballard, Prof. Crandall's principal assistant in this work, has been engaged in opening up coals, sampling the same for analyses, and making practical tests of the coking properties. Many tests have been made in the open air, and coal was sent to Cincinnati, O., and Connellsville, Penna., where it was coked in regular coking ovens.

The following analyses from carefully averaged samples are by Dr. Robert Peter and his assistant, A. M. Peter, Chemists of the Geological Survey, compiled from the analyses of one hundred and twelve coals in the forthcoming chemical report of the Geological Survey:*

No. in Chemical Report.	2403.	2404.	2266	2352.	2356.	2361.
Specific gravity.	1.271	. . .	1.254	1.291	1.286	1.319
Hygroscopic moisture.	1.60	1.80	1.10	3.26	1.46	2.86
Volatile combustible matter . .	29.36	26.80	36.44	32.24	33.26	31.54
Coke	69.04	71.40	62.46	64.50	64.90	65.60
Fixed carbon in the coke	67.40	67.60	59.66	61.60	59.70	62.10
Ash	1.64	3.80	2.80	2.90	5.20	3.50
Sulphur	0.610	0.967	0.613	0.656	0.678	.535

Nos. 2403 and 2404 are from the coal in the basin of the head waters of the Big Sandy river; No. 2266 from the Upper Cumberland, and Nos. 2352, 2356, and 2361 from the Upper Kentucky river.

For purposes of comparison, I give below analyses of the celebrated coking coal of Pennsylvania:

	1.	2.	3.
Water, at 225°	1.260	.950	n. e.
Volatile matter.	30.107	29.662	31.36
Fixed carbon.	59.616	55.901	59.62
Sulphur . . . . .	.784	1.931	7.84
Ash	8.233	11.556	8.23
Coke	68.633	69.388	68.00

Nos. 1 and 2, Connellsville coking coal. Analyses by McCreath, from second Geological Survey of Pennsylvania, vol. "M. M." page 22. No.

* It will be seen by a comparison with previous chemical reports, that the analyses of one hundred and twelve coals from nineteen counties in Kentucky show a better average in quality of coals than in any like number of coals hitherto analyzed.

3, Connellsville coking coal, Pittsburg seam. Second Geological Survey of Pennsylvania. *Special report L*, page 120.

The following table of analyses of cokes, compiled from the forthcoming chemical report, will show the excellent character of the coke made from the Kentucky coals. Analyses of the Pennsylvania coals are given for purposes of comparison:

	KENTUCKY COKE.				PENNSYLVANIA COKE.		
	1.	2.	3.	4.	5.	6.	7.
Moisture expelled at red heat. . . . .	.20	1.20	1.10	0.60	.460	6.10	.50
Fixed carbon	93.20	94.14	95.40	93.34	89.576	84.721	88.773
Ash.	6.60	4.66	3.50	6.00	9.113	12.636	9.512
Sulphur. . . . .	.734	1.484	.517	1.335	.821	1.994	1.328

No. 1, from Elkhorn coal, made in an oven in Cincinnati. No. 2, from Elkhorn coal, made in an oven in Connellsville, Penna. No. 3, made from Elkhorn coal. No. 4, made from Bell county coal. Nos. 5, 6, and 7, Connellsville, Penna., coke. No. 6 used at iron works of New Castle, Penna., and No. 7 used by the Cambria Iron Company, Johnstown, Penna.

The value of coke for the manufacture of iron is demonstrated by the rapid increase in the production of coke iron in the United States. The following table will show the increase since 1873:

	Anthracite Iron, Tons.	Charcoal Iron, Tons.	Coke Iron, Tons.
1873.	1,312,754	577,620	977,904
1880.	1,807,650	537,558	1,950,205

The value of the Elkhorn coking coal is determined by the following conditions: (1.) Superior quality, and cheapness by which it may be mined. (2.) Ease by which it may be brought to the Ohio Valley and the furnaces of Eastern Kentucky and Western Ohio, by proposed railways. (3.) The nearness to cheap iron ores of superior quality. (4.) The position with relation to the South Atlantic States, there being no coal between the southeastern border of this coal field and the Atlantic Ocean.

The amount of transportation necessary to bring the iron ore and the fuel to the furnaces in the United States is greater than is generally supposed. Says Mr. James M. Swank, Secretary of the American Iron

and Steel Association, and special expert of the Tenth Census, in his "Statistics of Iron and Steel Production in the United States for 1880" (page 168):

"From the ore mines of Lake Superior and Missouri to the coal of Pennsylvania is one thousand miles. Connellsville coke is taken six hundred miles to the blast furnaces of Chicago, and seven hundred and fifty miles to the blast furnaces of St. Louis. The average distance over which all the domestic iron ore which is consumed in the blast furnaces of the United States is transported, is not less than four hundred miles; and the average distance over which the fuel which is used to smelt it is transported, is not less than two hundred miles."

On top of the Subcarboniferous limestone brought up by the great Pine Mountain fault, there is an excellent iron ore near the Elkhorn coking coal. Along the border of the State, in Southwest Virginia, is an extensive deposit of the Clinton or "Fossil" iron ore—a very cheap ore, only a few miles distant from this, Kentucky coking coal, whilst there is an abundance of high grade ores in the valley of Southwest Virginia, and in Western North Carolina is an extensive deposit of what is probably the best steel-making ore in America. During the census year 1,414,182 tons of ore was brought from the Lake Superior region, and 439,451 tons from across the ocean, mainly to be used in the manufacture of steel—hailed hundreds of miles on railways to the furnaces in the valley of the Upper Ohio. Standing in Southeastern Kentucky upon the mountains containing the coking coal, and looking at the blue hills of North Carolina containing the great steel-making ores, I have realized that it is only necessary to make the facts well known to insure the building of railways to unite these great resources, and the consequent development of a great iron and steel industry in our midst, second to none in America. It is hoped to still further extend the known area of the coking coal during the coming summer. At the same time other valuable coals have been investigated, and the materials collected for a completed report on the counties studied, including study of soils, timbers, water-powers, etc.

Prof. Crandall has completed the study of Elliott county, and the map has been engraved and printed, ready for the forthcoming report, and the data collected for map and report on Martin county. Work in the Western coal-field was interrupted by the, it is hoped, temporary withdrawal of the gentleman who had it in charge, on account of more remunerative employment being offered elsewhere. The smallness of the appropriation, and the necessary additional expense involved in

making an exhibit of the resources of the State at the Southern Exposition, rendered it impossible to organize for work in that field during the past season. The abundance of valuable iron ores in the lower coal measures, and the almost certainty that the area of these ores can be extended to within a short distance of existing transportation ways, together with the abundance of good coal, renders it important that the maps and reports on that field be pushed to completion. In the Western coal-field iron can be made at a very low cost, and a large part of the iron used in the States of Indiana, Illinois, Missouri, and the Northwest should come from furnaces located in this portion of Kentucky.

(2.) GEOLOGICAL SURVEY OF AGRICULTURAL DISTRICTS.

The means at my disposal for this work were so small that I could not carry out plans as desired, but much work has been accomplished. In order to complete the geological map of the State, it was necessary to trace the divisions on the outer rims of the blue limestone of Central Kentucky. Around this central region extends, from the mouth of Salt river on the West to the mouth of the Scioto on the East, a continuous ridge, known as Muldrow's Hill, King's Mountain, Big Hill, and other local names, having an abrupt escarpment on its inner circle, and sloping away from the central uplifted dome of the "Blue-Grass" region as a broken plateau on the East, and an almost level plateau on the West, where the Subcarboniferous limestone determines the topography. The counties on the inner border of this great hill contain all the various formations, from the lowest rocks found in the State to the highest (excepting the region west of the Tennessee river*), thus giving a larger variety of soils, etc. It was, therefore, deemed of importance to first complete the geology of these counties, as all the formations in the State could thus be studied, and form the basis for future work in other parts of the State. The maps have been made and engraved, and geological work finished in the counties of Madison, Garrard, Lincoln, Boyle, Mercer, Marion, Washington, Nelson, and Spencer, and the data

* The above statement is subject to this explanation: I am convinced that the bottom land above overflow along the Ohio river, and extending up the valleys of the rivers in Kentucky, is the equivalent of the Loess or "Bluff" formation of Mississippi, West Tennessee, and the region referred to of Western Kentucky, and that the large gravel deposit on which this mainly rests in the Ohio Valley is synchronous with the Orange sand of Mississippi and the Paducah gravel of Kentucky, consisting, however, of remains of many rocks not found in the latter, although fragments of all of the paleozoic rocks of the Ohio Valley are found in the Paducah gravels of Western Kentucky.

partially obtained for map and report of Jefferson county. During the present year it is hoped to extend this work, and complete the maps and reports on the counties on the southeastern and eastern rim of the Blue-Grass region. This series of reports and maps, some of which have been published, and others are being published as fast as the maps can be drawn and engraved, will, I think, compare favorably with any similar work done in this country. They will prove of value in connection with the chemical analyses of soils, clays, etc., and will form the basis for scientific agriculture, and enable the intelligent farmers to utilize the investigations of the Geological Survey. Reference will again be made to this in discussion of the chemical work of the Survey. It is very desirable that this work be carried forward with greater rapidity, and I hope that it can be prosecuted during the coming season over the Subcarboniferous rocks of Southern and Western Kentucky. The map of the counties west of the Tennessee river, known as "The Purchase," has been completed and engraved, and data collected on the geology of a portion of that region. About two months' work in the field is necessary to complete the study of these counties, and make the collections of soils for analyses. It is important to carry this work forward in order to investigate the very valuable deposits of fire and pottery clays so very abundant in the Purchase counties. These clays occur in the same geological horizons as the clays of New Jersey. They are, as indicated by analyses, equal to the New Jersey clays, and some of them equal the celebrated clays of Strobridge, England, and the celebrated German glass-pot clays:* yet the manufactured products of the clays in New Jersey aggregated \$5,071,290 in 1880, as much as the product from all the iron manufactured in Kentucky for the same year. No region has more abundant transportation facilities, being surrounded on three sides by grand rivers, and traversed in all directions by railways, and there should be developed here extensive industries based on these clays. It is also important to study the cement materials and the most excellent road-making and concrete material, abundant in the Purchase counties.

(3.) CHEMICAL WORK.

In the spring of 1882 it was found necessary to purchase some new apparatus for the chemical laboratory, as the old had been in use for a number of years. It is believed that the laboratory is now well equipped

* Analyses and comparison of the clays of Jackson Purchase will be found in the 4th Chemical Report, vol. V, and in the report just issued by the Survey: "Comparative Views of the Compositions of Soils, Limestones, Clays, Marls, etc."

for effective work. No department of the Survey has achieved more advantageous results during the past two years than this under the able direction of Dr. Robert Peter, assisted by A. M. Peter. The forthcoming chemical report, now in the hands of the printer, will prove one of the most valuable yet issued by the Survey. Most of the one hundred and twelve coals, of which analyses are given, come from counties on which no reports have hitherto been published, and these analyses show coals of remarkable richness and purity. These, with the numerous analyses of soils, clays, mineral waters, rocks, and other substances, together with the valuable practical suggestions of Dr. Peter, render this report of peculiar value.

The Survey has just issued a report by Dr. Peter on "Comparative Views of the Composition of Soils, Clays, Limestones, and Marls," &c., of the several geological formations of Kentucky, as shown by the chemical analyses published in the several reports of the Geological Survey of the State. In this report are tables showing the averages of organic matter, alumina, lime, phosphoric acid, potash, and other elements in the soils from the various geological formations of the State, thus enabling the agriculturist, who may know from the geological maps on what formation his farm is situated, the elements composing that soil, and in what the soil may be deficient. As the Survey progresses, and the number of soil-analyses from which the averages may be made is increased, the value of the average is increased. In the above report a significant comparison is made with the richest soils of Europe (as shown by De Gasparin, a well-known French authority), and the soils of Kentucky. This comparison not only shows that in the unmanured soils of Kentucky there is a remarkable fertility, but this and other chemical reports show that in the subsoil and under-clays we have a mine of wealth, a heritage for future generations.*

* This is well shown by analyses of a soil, subsoil, and under-clay collected by the writer in Nelson county. These contain, respectively, fertilizing elements as follows:

	Top Soil.	Subsoil.	Under clay.
Alumina and manganese oxides	7.977	10.349	14.368
Lime carbonate . . . . .	.270	.245	.880
Phosphoric acid . . . . .	.108	.061	.102
Potash extracted by acids. . . . .	.116	.164	.361
Potash in the insoluble silicates	1.669	1.835	2.742

Thus showing the under clay to be richer than the top soil or subsoil.

The Survey has erected an oven for the practical testing of coking coals and clays.* Clays of great variety abound in Kentucky. Reference has already been made (page 9) to the excellent fire and pottery clays in the counties west of the Tennessee. In the two coal-fields clays of good quality abound. In the Eastern coal-field on the Ohio river fire-brick, etc., are made, and on the line of the Chesapeake and Ohio Railway preparations have been made for shipping clays existing there in great abundance. It is very desirable that these clays be utilized in our midst in the manufacture of the numerous articles for which clay is used. In the counties bordering on the Blue-Grass region are large deposits of useful clays, and it is hoped that the tests and reports of the Survey may lead to the establishment of potteries, etc., in various parts of the State. England mined, in 1876, 3,971,123 tons of clay, all of which was manufactured into wares, much of which was shipped to the United States, paying a duty of 45 per cent.

(4) TOPOGRAPHICAL WORK.

This department is in charge of Mr. J. B. Hoeing, who is well fitted for this work by a thorough training in one of the best engineering schools in America, and by long experience in the field and office. It is with no little pride that I call your attention to the excellence of the maps now being issued by the Survey, and ask a comparison with similar work done in other States. The topographical work may be divided into two parts: the gathering and arrangement of materials for the map of the State on a scale of 1-300,000, and the mapping of the separate counties on a scale large enough to show the topography and geology in detail.

One of the aims of the Survey has been the completion of an accurate topographical and geological map of the State of Kentucky. The plan for making such a map, was to collect and reduce to an uniform scale all the material from other sources, such as the triangulation by the United States Coast and Geodetic Survey, the river surveys made by the United States Engineer Department, the various railway surveys, etc.: to combine these with the work done by the Geological Survey into a skeleton map, which would give a basis for the future topographical work of the Survey, and could be gradually filled in as the work progressed. In accordance with the above plan, the work of selecting

* This work is in charge of Mr. R. C. Ballard, who will make collections during the spring, summer, and autumn months, and work up the results in the winter.

all of the available material already in the office of the Survey, and securing copies of all other reliable surveys to be obtained, was begun in April, 1882.

Copies were secured of all of the river surveys in the State, and of the surveys of the Ohio and Mississippi rivers made by the United States Engineers, and of all the various railway surveys in the State, both of located lines and preliminary surveys, of which maps had been made or field notes could be made. These were all placed at the disposal of the Survey, and, in many instances, the use of the engineers' offices of the various railways given to the officers of the Survey engaged in this work, and every assistance rendered by the railway officials. This work was very laborious, as often long searches through dusty maps and archives, stored in dark vaults or lumber-rooms, was necessary to secure the desired data. This work was mostly done by Mr. H. B. Blair, who went to the railway offices in Cincinnati, Covington, Louisville, and elsewhere, and Mr. Robert B. Barr and Mr. E. C. Linney, who copied in the office in Lexington such maps and note-books as were sent in. Most of these maps were on a scale of 400 or 500 feet to the inch, which, while it increased the accuracy, also made a vast amount of labor in copying them. The Survey has thus secured copies of nearly all the railway surveys ever made in the State, excepting those of which the records have been destroyed by fire. It is estimated that, altogether, 6,000 miles of lines traced and platted from reliable sources, outside of the lines run by the Geological Survey, have been secured in this way. Many of these lines have already been reduced to the scale of the State map, and some to the scale of two miles to the inch for the county maps. To obtain greater accuracy, and render more available the various railway and river surveys, application was made to J. E. Hilgard, Director of the United States Coast and Geodetic Survey, for the establishment of the latitude and longitude at certain points, and for the continuation of the triangulation of the State. I beg here to acknowledge the important work done in the State by the above named Survey.

In addition to the few points hitherto established, an astronomical party was sent into the State, and worked during a portion of the years 1882 and 1883. We now have accurately determined by this method the following points in the State, or immediately on the borders: Louisa, South Point, opposite the mouth of the Big Sandy river, Cincinnati, Louisville, Henderson, Paducah, Cairo, Hickman, Guthrie, and Jellico, making almost the circuit of the State; and in the interior, Falmouth, Shelbyville, Cox and Williams Knobs, Oakland, Lexington, Richmond,

Greensburg, and London. After the collecting of the above material, Mr. Hoeing began the platting of the State map on a scale of 1-300,000 (the nearest decimal scale to one of five miles to the inch), platting from tables constructed from formula furnished by the United States Coast Survey, on what is known as the Rectangular Polyconic Projection, which has been adopted by the Coast Survey as the best for maps of that area. The sheet will be large enough to show a small portion of each of the States bordering on Kentucky, and will admit of sufficient detail to show all of the prominent features of the topography down to the wagon roads. Naturally, the first work, after* locating the points established by latitude and longitude determinations, was to plat in the boundary lines of the State. From the United States Engineer Department Surveys, we were enabled to obtain a portion of the Big Sandy river, the Ohio and Mississippi river boundaries of the State, and the southern line from the surveys made by the Commission of Engineers appointed conjointly by the States of Tennessee and Kentucky to survey the line from the Mississippi river to Cumberland Gap. From Cumberland Gap to Potato Knob, in Harlan county, the State line was surveyed by Mr. C. Schenk, of the Geological Survey. There remains a small portion of the line between Kentucky and Virginia, and a portion of the line between Kentucky and West Virginia, to be surveyed before the boundary of the State is completed. The work on the State map has been interrupted within the past two years by the necessity of taking Mr. Hoeing from this work to complete the county maps. For each county map a basis was constructed from the railway and river surveys, to which all other surveys to be had were added, after being filled out and corrected from notes taken in the field.

Reference has been made to the county maps completed during the past two years. During the summer and autumn of 1873, Mr. Hugh R. Ayres was sent with a party to finish the topographical work in the counties west of the Tennessee river, known as "The Purchase." This work was well done; the map drawn and engraved, and the first proof of this excellent map, comprising the counties of Marshall, Calloway, McCracken, Graves, Ballard, Hickman, and Fulton, has been received. Thus, during the past two years, the maps of seventeen counties have been completed, drawn, and engraved ready for distribution. In these are comprised the first maps in detail, on which the geology has been printed in colors, published by the Geological Survey since its organi-

* From this it is shown that some of the important points in the State are as much as six miles out of their proper positions, on the best maps now existing.

zation. It is hoped to color the geology on all the maps hitherto issued by the Survey, and reduce all to a common scale. A map of the counties in the Southeastern coal-field is now in process of construction under the direction of Prof. Crandall. A map begun a few years since of the region between the Tradewater and Tennessee rivers has been drawn, but will require a few months of field work to complete. This is also true of a map of Monroe, Cumberland, Clinton, Wayne, and adjoining counties. On a number of other counties, sufficient data are on hand to construct maps, with slight additional work in the field, which could be done at the same time with the field work for the reports on the geology of these counties. In this connection, I wish to call attention to the condition of the county lines all over the State. Often imaginary lines have been made by enactments of the Legislature, calling for certain dividing ridges, or, for a straight line between two named points, and no survey of such lines has ever been made; and even where surveys of lines have been made, they have often been surveyed in a very rough manner, and but few persons seem to know anything about them. When records are to be had, they do not agree with the lines on the ground, thus causing great confusion and trouble in showing them on the maps. In fact, with the exception of a few counties, it is impossible to put the county lines on the maps with any degree of accuracy. In order to obtain all the information possible, copies were made of the records, but it was found that only a few of these could be used. It is very important for the purpose of knowing the area of the various counties, and for other reasons apparent to all, that these county lines be accurately surveyed and established wherever they may be in doubt. It would seem proper that this be done by the various County Surveyors jointly. Of course it would be necessary for the Legislature to authorize this work, and make provision for the payment of the Surveyors. Should this be done, and the topography on the lines given, it would facilitate greatly the completion of the State map.

The value and importance of an accurate map of the State is too apparent to need argument from any one.* It is, I trust, not a vision-

* With the exceptions of the original thirteen States, and Kentucky, Tennessee, and Texas, all of the States have been surveyed by the General Government, and maps made. These maps are utilized by the various State Geological Surveys, thus saving greatly in the time and cost of such surveys. The triangulation of the United States Coast and Geodetic Surveys has been carried over some of the Eastern States, forming a basis for accurate maps; and the United States Geological Survey has executed admirable maps

ary hope that this work will be prosecuted to completion, and that we may in a few years see a correct topographical and geological map of Kentucky hanging in every school-house of the State, and that it shall be part of each child's education to learn something of the resources and capabilities of this grand State.

(5.) COLLECTING FOR THE GEOLOGICAL CABINET, &c.

In the large room, on the second floor of the new Capitol, has been collected a cabinet illustrating the resources of the State, the fossil remains, photographs, etc. This collection has been added to, as the Survey progressed, until it has become of great value. A catalogue of the specimens has not been prepared, but they are crowded in cases and drawers, the shelving covered by the specimens aggregating 1,500 square feet. This collection is doubly valuable in illustrating to persons who visit the State its varied resources, and in making our own citizens acquainted with the capabilities of their native State.

It is the desire of the Geological Survey, in the prosecution of the work, to collect duplicates of fossils, ores, coals, etc., in order to prepare collections of typical specimens for the various schools and colleges of the State. I deem this of very great importance, and regret that the limited amount of money available has not enabled the Survey to carry out my plans in this respect to the extent of my wishes. A very valuable library of reference, consisting of Geological Reports from various States and foreign governments, Agricultural, Statistical, and other kindred reports, and a large number of pamphlets, has been collected, and additions are constantly being made. This collection has been made without cost to the State or Survey. In addition to the books on science, statistics, etc., I have attempted to collect and preserve all books and pamphlets relating in any way to Kentucky, believing that in time such a collection will be of great value to the State. A very valuable addition was made to the State cabinet during the past year by gift from the United States Geological Survey, consisting of thirty large photographic transparencies on glass, illustrating the scenery of the great West, and the ethnology of the Pueblo Indians of Arizona and New Mexico; a number of large relief maps illustrating geology and topography of the West, models beautifully colored of some of the

of some of the Western States and Territories. No map, approximating to accuracy, has yet been made of Kentucky, and the needs of such a map are yearly increasing. Much of the confusion respecting land titles in portions of the State would have been avoided had there been a correct topographical map.

pueblos of the Southwest, a large collection of photographs, etc. This interesting and unique collection was prepared by the United States Geological Survey for the Southern Exposition held in Louisville last year. At the close of the Exposition, Maj. J. W. Powell, the Director of the Survey, through the instrumentality of Hon. J. C. S. Blackburn, presented this collection to the State of Kentucky. It has been arranged and placed on exhibition in the State Geological Cabinet, where it is accessible to the public.*

(6.) OFFICE WORK.

The office work has increased very much during the past two years, owing mainly to the correspondence, which has grown with the progress of the Survey. Much of this increase in the correspondence is caused by the many publications sent out by the Bureau of Immigration, and the increasing desire in Europe and in the Northern and Western States to obtain information respecting Kentucky. As care and accuracy is necessary in answering such letters of inquiry, much time is consequently devoted to the correspondence of the office. It is of the utmost importance that this part of the work be not neglected, as I have found that letters of explanation are probably more effective than published reports; they certainly form a most important adjunct. All letters are carefully filed and indexed, and an inspection of the letter files of the Survey will enable persons, who desire such information, to form an

* This collection consists of the following: Topographic Relief Casts; Grand Cañon of the Colorado; Yellowstone National Park; Elk Mountains, Colorado; High Plateau of Utah; Vesuvius and Somma Volcanoes; Montezuma's Well, Colorado; Ethnologic Relief Casts—Pueblo of Taos; Pueblo of Tewa; Pueblo of Acoma; Round Tower in Colorado; Mounds in Illinois. The large framed Photographic Transparencies (30"x36", each) are: Cañon Del Muerte, from the Mummy Cave, Arizona; Mountain of the Holy Cross, Colorado; Cañon De Chelly, Arizona; Great Falls of the Yellowstone, Yellowstone National Park; Mammoth Hot Springs, Yellowstone National Park; Grand Cañon of the Yellowstone; Grand Cañon of the Colorado, looking up; Grand Cañon of the Colorado, looking down; Marble Pinnacle, 2,500 feet high; Kanab Cañon; Monument in Cañon Del Muerte, Arizona; The Abandoned Boats, Kanab Cañon; Captains of the Cañon, Cañon De Chilly, Arizona; Terraced Houses, Wolpi, Arizona; Zuni, New Mexico; Terraced Houses, Zuni, New Mexico; Ruins of Cliff Dwellings, Cañon De Chelly, Arizona; A Moki Indian Weaving a Blanket; Zuni Transportation; Tesuque Oxen and Cart; A Moki Spinning Wool; Governor of Tesuque, showing manner of using drill; Wolpi, one of the Moki towns, Arizona; Pueblo De Taos, New Mexico; A Zuni Eagle Cage; Pedro Piño, a Zuni Chief; Meirishash—Absaroka Chief; White Thunder—a Dakota Chief; Knuqnaquiaq, Arikara Chief; Red Cloud—a Dakota Chief; A Moki Boy. In addition to the above, there are in this collection 187 large photographs mounted on heavy cardboard.

estimate of the scope of the work, and the influence of the Survey in the development of the State. When the weather will not admit of work in the field, the field-notes are worked up in the office, reports written, geology colored on maps, proofs corrected, and the publication of maps and reports, and classification and naming of specimens collected, attended to.

In the four volumes published before the war, as the results of the Geological Survey under the able direction of Dr. D. D. Owen, there is a mass of valuable information, unavailable to the general reader, for the reason that the information gathered respecting one county may be scattered through the four volumes, and only the special student will take the trouble to dissect and combine this information. It was my intention to codify the chemical and agricultural data contained in these volumes (long since out of print) in a small volume, but I have concluded that it would be more valuable if this was elaborated in the various county reports, combining the same with the information gathered by the present Survey, giving credit by marginal references to the several volumes from which such information may be extracted. I am of the opinion that enough preliminary or reconnoissance work has been done by the Survey, and the work of the past few years has been directed with a view of securing complete (so far as the means will permit) final reports on the various regions studied. This, whilst it will lessen the number of reports published, will be a saving in time and money, as the special information contained in a preliminary report on a district must be duplicated in the final report, which should contain all that is known of the geology, soils, timber, etc. In the first stages of the Survey this preliminary or special work was necessary in order to obtain needed information on the general Geology of the State. Besides, the impression prevailed that the Survey might be discontinued before attention was given to the several localities. The method which this involved, whilst it was sufficient to meet pressing demands for special information and has been productive of good, has not been so advantageous or economical as a plan based on the conviction that the Survey would be conducted to completion, and that when work was begun in a locality it should be only with a view of obtaining a final report, and should be prosecuted without interruption until that should be accomplished.

All of the reports issued by the Survey are stereotyped, and the maps engraved on stone, the plates remaining the property of the

State, so that at any time new editions may be printed if desired. In addition to the county reports, which will be published in regular series as fast as they can be prepared, it is the intention of the Survey to publish a single volume in which shall be epitomized the results of the Survey, giving a condensed description of the entire State, its topography and geology, agricultural features, flora and fauna, &c.; in short, a complete description of Kentucky. This, with the completed geological map, will be pushed to completion as rapidly as is consistent with accuracy. Much of the data for such a report is already in possession of the Survey. During the past year several Memoirs on purely scientific subjects, prepared under the direction of my esteemed predecessor, Prof. Shaler, have been published; and the plates printed for a memoir on the fossil brachiopods, and one on the corals from the rocks of Kentucky. Much of the text for these Memoirs is in type, and they will not only reflect credit upon the State, but, on account of their scientific value, they will command a price sufficient to reimburse the State for the entire cost of preparation and publication. Volume V (New Series) has been published, and is now ready for distribution, together with some of the county reports referred to elsewhere.

SOUTHERN EXPOSITION, 1883.

This report would be incomplete without mention of the exhibit made by the Geological Survey at the Southern Exposition. The great Cotton Exhibition held at Atlanta in 1881 was the first combined effort of the Southern States to make known to the world the great potentiality of the South. That exhibition of Southern resources was a revelation even to the people of the South, and was productive of far-reaching good to the Southern States. Realizing that it is not by one, but by repeated and persistent efforts that the desired results are to be attained, the citizens of Louisville, with commendable enterprise, decided to have a Southern Exhibition commensurate with the rapid advances made by the New South; and the money for this great undertaking was raised without asking for help outside of the city. The results were beyond the most sanguine hopes. An exhibition second only to the great Centennial Exhibition of 1876—and in some respects surpassing that exhibition—was perfected in a remarkably short time, and gave the strongest evidence of the great resources of the South, and the future possibilities of that great undeveloped empire. Unfortunately there was no session of the Legislature after this exhibition was projected,

and consequently no appropriation to enable the State to make such an exhibit as the importance of its varied resources would warrant.

It was determined to make such an exhibition by the Geological Survey as the limited means and shortness of the time at command would admit of. It is needless to detail here the bringing together, at Louisville, of collections made from all over the State, by means of correspondence with public-spirited citizens, and visits to many localities by members of the Survey, and by the aid of some of the railways in the State.* These collections and selections, made from the Geological Cabinet at Frankfort, were placed in the exhibition under the direction of Mr. W. M. Linney, and to his faithful and efficient work the creditable appearance of the Kentucky display at the Southern Exposition is mainly due. It is to be regretted that this emergency demanded the withdrawal of Mr. Linney, for a few months, from geological work in Central Kentucky, where, by his long study of the rocks, and by his habits of careful observation, he is well fitted to do effective service.

The members of the Survey sent in from their respective fields of operation such specimens as they thought most worthy.† A beautiful Swiss cottage was erected by a Swiss carpenter, from the Colony Bernstadt, Laurel county, which was occupied during the Exposition by a skillful wood-carver from the above-named colony; and a very creditable exhibit of field and garden products was made by the Bernstadt Agricultural Society, and by some of the colonists from other parts of the State. I have an opportunity to know that this exhibit of the resources of the State has already been productive of much good to the State. Many of our own people, even among the best informed, had no realization of the greatness of the State's resources until they saw this exhibit. As to the comparative merits of the exhibit, let the following,

*Indeed, but for the liberality of the railways, and more especially the Louisville and Nashville, it would have been impossible for the Survey to have made a creditable display. All collections, including the material sent from the State Cabinet, and the large blocks of coal and ore from various parts of the State, were carried to the exhibition and returned free of cost. I desire here to thank the officials of the railways in Kentucky for this, and for the generous aid and coöperation extended to the Geological Survey and the Bureau of Immigration.

†One of the most interesting features of the entire exhibition was a column of the Elkhorn coking coal from Pike county, Ky. This column of coal, 8 feet 6 inches high, showing the entire thickness of the stratum, was taken from the bed, boxed and shipped to Louisville free from a single fracture—a most difficult undertaking owing to the nature of the coal, the roughness of the roads, and distance from railway. The complete success was due to the energy and skill of Prof. Crandall.

from the report of the Judges of Group I, speak. The following medals (of highest award) were given to the Kentucky Geological Survey exhibit: (1) "For general excellence and extent of display;" (2) "For the best exhibit of superior bituminous coals, in number and size of specimens;" (3) "For the best exhibit of cannel coals;" (4) "For the fullest collection of limonite and coal-measure iron ores;" (5) "For superiority in number and scientific value of fossils exhibited;" (6) "For a collection of geological maps and topographical photographs;" (7) "For the best prehistoric archæological display;" (8) "For Swiss cottage and collective exhibit, illustrating immigration to Kentucky." In addition to the above first awards, six certificates of award were given to the Geological Survey for exhibits of building stone, timbers, and polished woods, pottery and fire-clays, marls, paint earths, polishing material, mineral waters, etc.

It is probable that this exhibition will be repeated on an enlarged scale this year (1884), and it is hoped that provision will be made to have the resources of the State well represented.

I have thus briefly sketched the progress of the Survey during the past two years. In making comparison with the work of previous years, or by Geological Surveys in other States, it must be borne in mind that the appropriation made for the Geological Survey by the last Legislature was (after deducting the amount appropriated for the Bureau of Immigration) the smallest appropriation made since the inauguration of the present Survey, and insignificant in comparison with similar appropriations in some other States. The Geological Reports, maps, etc., of the several States are in the Library of the Survey, where a comparison with the work of the Kentucky Survey may be made by persons wishing information on this subject.

Before concluding this summary, I wish to make public acknowledgment of my great obligations to my co-workers in the prosecution of the Survey. By their intelligent co-operation and love for their professional duties, and devotion to the best interests of the State, the labor of directing the work, which, otherwise, must have been a most irksome task, has been rendered a pleasant duty. But for the labors of these gentlemen, my work, however earnest and well intended, would have been fruitless of good results.

(7.) BUREAU OF IMMIGRATION.

In April, 1880, the Legislature created a Bureau of Immigration, and placed the same under the direction of the State Geologist. During

the first year little could be accomplished beyond perfecting an organization, the preparation of reports, and beginning a correspondence with persons in this country and in Europe. In the spring of 1881 the first colony was established by the Bureau, in Laurel county, consisting mainly of agriculturists from the Canton Bern, in Switzerland; and much was accomplished during that year to attract attention to Kentucky.

In the spring of 1882 a more liberal appropriation for the Bureau was made, and the following are some of the results of the work since that time:

I deem it of paramount importance that, in bringing people into Kentucky, great care should be exercised in making a selection, as superior intelligence, industry, and thrift, rather than numbers, are desired. For this reason it was thought best to reach the foreign emigrant before he should leave his home, rather than trust to drawing from the undecided after they might arrive on our shores, as it is evident that the better class determine upon their destination before departing from their homes. In the spring of 1882, Mr. E. A. Fellmer, Secretary to the Bureau, was sent to Europe to visit some of the correspondents of the Bureau, to acquaint himself with the methods adopted by other States to secure immigrants, to arrange with agents for the distribution of publications from Kentucky, and make such arrangements as he deemed advisable for making propaganda. It was also intended that he should inform himself respecting the countries from which the most desirable class of immigrants could be obtained. I cannot too highly commend the efficient labors of Mr. Fellmer on the trip to Europe, and in the office since his return. He visited Southern Germany, Switzerland, Bavaria, Austria, and France, exercising the utmost economy, and at the same time by his diligence and zeal succeeding in making the State favorably and widely known in the countries visited. The newspaper notices of the first colony, together with the advertisements, newspaper articles, and publications sent out from the Bureau, brought an extensive correspondence with persons seeking homes. This correspondence continues to increase in bulk and importance, and the character of the letters received is sufficient guarantee for the high degree of intelligence of the persons coming into the State. Already quite a correspondence has developed from the Northwest, and many intelligent and well-to-do farmers have come into the State from the Northern and Western States, and if the work is properly continued, I am confident that large numbers of the best class of farmers will be induced to come from Illinois, Ohio, Wisconsin, Minnesota, and other States. The many letters

received, expressing satisfaction from those who have moved into Kentucky from the above named States, is the best assurance that others will follow.

Especial efforts have been directed to the location of Colonies, with a measure of success. At least a good foundation has been established on which to build, and as these Colonies succeed and grow in size and numbers, attention will be attracted to the State. Of the first Colony established, Bernstadt, no report has been made since October, 1883, as the Director of that Colony is temporarily absent in Switzerland.* At the last report there were 440 persons settled on the Colony lands proper, having purchased 4,146 acres.

It is estimated that the above number does not represent one half of the immigrants that have settled in Laurel county, a majority having purchased lands outside of the Colony bounds. I have hopes of a very substantial success from this first Colony. Such patient industry and thrift as I have seen among these people must bring success. The land is a sandy loam with a good clay subsoil, and responds most readily to the use of manures. The colonists expect to engage mainly in the cultivation of fruits and vegetables, grape-growing, wine-making, and cheese-making. As a large number of the farmers are also mechanics, small industries will gradually be developed, mainly such as will be the natural outgrowth of the diversified agriculture in practice. New accessions are steadily being made to the Colony, and it is a hopeful sign that these are mostly friends of the first comers, who are brought over mainly by the letters written from the Colony. I select the following extract, translated from a recent letter received from one of the colonists, dated Bernstadt, December 8, 1883:

"We are well satisfied with the results of the first year spent here. * * * * One must not be afraid of work and trouble; but we are used to that, and here it is at least not in vain. Within a few years any one who loves to work can here acquire a pleasant home, which is more than many an one could ever have accomplished in the old home."

The following translation is from a letter from Mr. Robert Ueltschi, one of the first settlers in the colony, an experienced and very intelligent farmer. This letter was written after an experience of growing two crops in the Colony:

*Mr. Paul Schenk, the Director, is now in Switzerland in the interests of the Colony, and expects to return in the spring with a number of immigrants. Mr. Schenk's high standing in Switzerland—his father being an ex-President of that Republic, and at present a member of the National Cabinet—gives him the confidence of the best people, and we may be assured that he will bring only good and valuable citizens to Kentucky.

"Knowing that you always take a great interest in the success of our Colony and promote its welfare by your counsel and assistance, I take the liberty to give you the results of my observations made in the course of one year, and I am glad to say that no impartial person, who examines the Colony carefully and observes what has been done within so short a time, can have the least doubt of its rise and permanency. The productiveness of the soil is in the main satisfactory, and where one is able to assist it by manuring, it is surprising how rapidly this tells upon the growth of the plants. * * * Now, when we consider the prices of land here in comparison to those in Switzerland, for instance, in the Sémmen Valley, Canton Bern, my old home, where good land costs from 1,000 to 2,000 francs per 'Juchart' * (4,000 \square feet), it is easily seen where heads of families can most readily make a living; moreover, the taxes upon each 1,000 francs' worth of property amounts here to only $4\frac{1}{2}$ francs. Prices of land vary hereabouts; close to the railroad older farms cost from \$8 to \$15, *timber land* from \$3 to \$5, and about twelve miles from the railroad enough good farms can still be bought at from \$3 to $\$3\frac{1}{2}$ —all per acre. Ample sale, at satisfactory prices, for all produce quite near by."

About 50 Swiss have settled in Lincoln county, but not near enough together to be classed as a colony. These are intelligent farmers, some of them being enabled to purchase for cash high-priced farms. A letter from one of these Swiss, dated January 10, 1884, says:

"We have renewed proofs of the fact that our countrymen, as well as myself with my numerous family, have made a good choice in coming to this State and selecting the place we are now occupying, and which is daily becoming dearer to us. * * * Concerning the present condition of our various colonists, it may be said that, in general, it is very satisfactory."

In the southern part of Laurel county has been established a Colony (Strassburg), consisting mainly of wine-growers from the Upper Rhine. These, as well as the Swiss in Bernstadt, have planted a number of vines, and I have every reason to believe will be successful in producing good wine. There is no fear that business can be overdone in America. The demands for pure native wine is increasing year by year. The extent to which grape-growing and wine-making can be carried on in this country is great beyond conception. France has an area of 204,147 square miles (less than the area of the State of Texas), yet on 4.27 per cent. of the area of France the product of wine in 1870 was 1,570,371,230 gallons, worth, at the low price of 25 cents a gallon, \$392,592,807, or more than the value of the entire wheat crop from the whole United

* This would be equal to from \$217 to \$434 per acre. I was informed by Mr. Ueltschi that his farm in Laurel county, Ky., produced equally as well without manuring as the land referred to in the Sémmen Valley, Switzerland.

States for that year. In other words, France, on an area a little more than one-fifth the size of Kentucky, produced wine valued at more than the value of the wheat crop of the United States, or of the cotton crop. I have returns from the profits of grape-growing and wine-making in Kentucky, Tennessee, and Alabama, on coal-measure soils, giving a larger profit per acre than is realized in France, except in favored localities. Yet the product of wine in France is 100 gallons to each inhabitant, and in the United States but a fraction over one-half of one gallon to each inhabitant. Surely we have room for many grape-growing colonies in Kentucky.

Of the condition of the colonists in the Strassburg Colony, I copy from the following official communication from the Chief of the Colony, Karl Hanser, signed by all the heads of families in the Colony, dated January 4, 1884:

"The situation, as well as the quality of soil and the climate, is particularly favorable for us farmers, who are mostly carrying on grape culture. * * * Finally, honored Mr. Procter, this is signed by all settlers here present to show that each one is satisfied with his present condition, and that, to this day, none of us have regretted our choice of the State of Kentucky for our permanent home."

In Rockcastle county lands have been purchased and a Colony established and named Pine-Hill-Salzburg. A few colonists have arrived, and Mr. Otto Brunner, one of the founders of the Colony Bernstadt, is now in Europe in the interest of this and other colonies. Mr. Brunner writes to this office from Bern, January 8, 1884:

"Already many people have visited me to get information about Kentucky and the Southern States. To-morrow I have my first lecture on Emigration and Colonization into Kentucky, in the Masonic Hall of the City of Bern; next week I address the Grütli Society, and I have invitations from Bale, Zürich, St. Gall, and other parts of Switzerland to address the people on emigration. We will have an important emigration this spring, and I will be glad to direct it as much as possible to Kentucky and the South."*

Large as is the amount of money brought into the State by this class of immigrants, I consider the greater gain to be in the habits of thrift and industry, the inherited habits of taking care of and improving lands,

* Mr. Brunner's high character and intelligence give great weight to his statements. He has made emigration a study, and having a knowledge of Kentucky, acquired by a residence of several years, he can speak with authority. He was formerly Director of the Agricultural College at Strickhof, Switzerland, and has established in Kentucky a paper printed in the German language ("Der Kentucky Colonist"), devoted to immigration. The circulation of this paper is growing in Switzerland and in the Northwestern States.

and of spending the surplus earnings in permanent improvements. Many of even the poorer immigrants have already accumulated around them more of the evidences of comfort and good living than is to be found in the homesteads of most of our native population similarly circumstanced.

I think the Swiss are well suited to our coal-measure soils, and we cannot get too many of such immigrants. The United States Consul, at Basle, Switzerland, in his report to the Department of State, July 24, 1882, after describing the excellent character of the Swiss now emigrating to America, says: *

"Of emigrants like these the United States can never have too many. Their thrift and industry will make the waste places of the South and West blossom like the rose. * * * They note the greatly-improved character and condition of the emigrants as compared with those of two or three years ago. Each year the drain affects a higher, more independent, and valuable class. The average amount of money taken away by each out-going family increases year by year."

In the spring of 1883 a Colony was located in the Southern part of Boyle county by Alois Rösel, from Austria. This Colony (New Austria) is making satisfactory progress.† The reports sent out are bearing fruits, and colonists are arriving, and more are expected. From a report made December 24, 1883, signed by the heads of families, the following extract is translated:

"In a few words we have told you the most important points. Any one may convince himself of their correctness, and if sooner or later you will honor us with a visit, you will discover the truth of all that has been said, and see with pleasure what we have accomplished thus far. May the Almighty grant us the same health and prosperity in the future that has been given to us in the past year, and we will, upon this little spot of the earth, found us a new home. We hope soon to feel as much domesticated in Kentucky as in our old home."

In the spring of 1883 a Colony of Swedes was located at Bee Spring, in Edmonson county, under the direction of Thunstrom & Seaburg. This is designed as a Scandinavian Temperance Colony, and has been named "Templar Springs Colony." A number of Swedes have arrived, and others are expected. From the last report made from the Colony, dated December 30, 1883, I extract the following:

"Our Colony is doing better and better week by week. We have recently got some settlers from Illinois—first-class farmers—they have

* U. S. Consular Reports, No. 22, page 541.

† The success of this Colony is mainly due to the public spirit, kindness and energy of Mr. C. S. Jackson, of Boyle county. Could the Bureau have the coöperation of a few more such men in the State, the success would be much greater.

already their houses built, and a good part of their land ready for cultivation. They mean *farming*. In addition to our saw and grist-mill, we have now got a complete flouring mill attached."

Through the instrumentality of the Rev. Fritz L. Braun, a Lutheran pastor, now residing in Hopkinsville, a number of excellent farmers have settled in Christian county, mainly from Wisconsin and other Northern States. Rev. Braun writes that these people are well pleased, and will induce many of their friends to follow in the spring.

About twelve thousand acres of land were purchased in the autumn of 1883 in the southern part of Lincoln county by a Colonization Company organized in New York, and a Colony (Highland) already located under the direction of Mr. J. Ottenheimer. Colonists are arriving, and extensive preparations made for a large and prosperous Colony. The gentlemen who have the management of this Colony have exceptional opportunities for reaching the better class of immigrants, and it is their intention to be very careful in selecting only of the best. It is hoped to locate other Colonies during the next year, and every effort will be made to build up and encourage those already established. It has been impossible, for lack of means, to meet the increasing demands for publications respecting Kentucky.* As the Bureau of Immigration has been largely advertised in Great Britain, Southern Germany, Austria, Switzerland, and Sweden, and in the Northern States, it is reasonable to suppose that this demand for publications will yet increase, and it is very important that provision be made to meet all requirements. No investment can be made by the State which will yield so large and so immediate a return.

Much attention has been devoted during the past year to making Kentucky favorably known in Great Britain, and I feel assured of the beginning of a good immigration of British farmers in the spring. A few young Englishmen have been located in the State with farmers. These expect, after learning our system of agriculture, to purchase farms. Some English farmers have settled in the State already. Hitherto the English have gone mainly to Canada, the Northwestern States of America, and to Texas. By proper efforts, a great number of well-to-do British farmers can be brought to Kentucky.

Whilst the Bureau of Immigration brings additional labors to the Geological Survey, I think that at this time it is of the utmost importance that it be sustained, and rendered more efficient. Kentucky and Tennessee, from their peculiar situation between States, both on the North

* See appendix A, List of Publications issued by the Bureau of Immigration.

and South, having public lands, and lands granted to railways, are necessarily more dependent than are other States on the efforts of State Bureaux of Immigration to obtain their due share of the wealth and the wealth-producing labor coming to this country, as well as to check the emigration of their own citizens. The causes of this are obvious. The railways in the North and West receiving immense grants of land have established land and immigration bureaux, and by means of most extensive advertising and the broadcast distribution of alluring publications (often regardless of truth), have drawn an immense immigration from abroad, and from the older States. The building of railways with money from the sale of bonds, predicated on these grants of land, has been another means of attracting capital and labor. Foreign and Eastern capitalists, by investing in these bonds, became interested in the development of the Northwest, and the press of Europe and America has been used unstintedly to push forward the interests of that section. The granting of lands to soldiers and to actual settlers, under the homestead laws, has been another cause of attracting immigrants. The maps, Geological Surveys, and elaborated reports made by the General Government on these Northwestern States and Territories has been another cause of advancing them, often at the expense of the older States. All of the above causes united to bring about an inflation in all kinds of business, and the prosperity thus induced was contrasted with the lack of progress in the South, where immigration was kept out by slavery before the war, and since the war by the disorganization caused by the war and the reconstruction measures following, and by the publications of a subsidized press. The above causes, and the prosperity of one section at the expense of another, have carried many people away from Kentucky. By the census of 1880, it is shown that 454,198 persons born in Kentucky reside in other States. We are now threatened with a similar attack from the South and Southwest.

Large donations of lands have been made to railways in the States of Alabama, Florida, Mississippi, Arkansas, Louisiana, and Texas. These lands, from causes above referred to, have been until recently kept out of the market. The growing prosperity of the South, the demands for Southern lumber, and other causes, are bringing these lands into market, and throwing them open for settlement. The Southern railway companies have organized land and immigration departments, and capitalists have purchased large tracts of land from the railways, the States, and the General Government, and are already making propaganda in this country and in Europe, in order to induce the settlement of immigrants

upon their lands. This is noticeable in the publications by the English press, mainly respecting Florida and Texas. We may expect to see numberless alluring publications about the profits of "fruit culture," "truck farming," "orange groves," etc., etc., and many of our citizens will, by these means, be induced to go to the South and Southwest. We can only hope to compete with the above-mentioned influences from the North and South by a well organized Bureau of Immigration. In Kentucky we are threatened with another danger—a serious depletion of our farm and domestic labor from the following causes: The tendencies of the negro to leave the farm, and congregate in towns and villages are well known. This has withdrawn many from agriculture. The large development of the mining industries will draw many to the mines, as the pay is better than on the farm, and the negro makes an excellent coal-miner. Formerly, all of the work on railways and turn-pikes constructed in the State was by white labor, mostly foreign. Now this work is mainly done by negroes, and as the amount will greatly increase, and also the demands in the mines and factories, we may expect larger drains upon this class. Provisions must be made to meet this, and to increase the agricultural labor of the State, and to supplant ignorant, wasteful labor, with intelligent, skillful labor.

I call your attention to another serious evil to be corrected only by immigration. It is well known that in the South a system of agriculture has obtained, which I have been compelled, for want of a better term, to style a marauding agriculture. The lands, after exhaustion by improvident tillage, are abandoned, and new lands cleared, and the same process repeated. This has been a two-fold evil. The tillable area has, by this means, been constantly diminished, and, on account of the mobility of population, and the disposition to move after destroying the lands, permanent improvements were seldom made. This is notably the case in many counties in Kentucky. Our people by this system have inherited these land-destroying tendencies, whilst in Europe, on account of the high price of land, small size of farms, and the advances in agricultural science, the people are conservators of land, and have an inherited thrift and care for land. The sand dunes of Belgium have, by this tendency of the population, been made the most fertile portion of Europe.* It is possible to locate upon aban-

* I have seen, in an hours' ride through the German and Swiss Colony of Cullman, Ala., situated on the thinnest of the coal-measure soils, more comfortable homesteads, good barns and fencing, and a better evidence of good tillage, than I saw in two days' ride through a region of much better land in the same State, where the marauding system of agriculture was in practice. These colonists had in ten years accumulated more comforts, and had added more in the way of permanent improvements, than had the native population, born and reared upon the same lands.

doned lands a people who will restore them, and make them a source of profit to the State, instead of a burden and a cause for shame. The demands for the products of the forest, and the larger profits to be thus obtained, will draw many from the farms, particularly in the regions being opened up by railways, and it is important that a population devoted to agricultural pursuits, and to the improvement of lands, be located upon these lands. The recent advances in agricultural science have a tendency to equalize the value of lands. By the use of fertilizers, and the adaptation of crops best suited to the varieties of soils, those hitherto thought of little value have often been made to yield larger returns than richer lands elsewhere.

I believe that all parts of Kentucky can be made suited for profitable agriculture. It is well known that coal-measure soils elsewhere, not so fertile as the coal-measure soils of Kentucky, yield large agricultural returns. Massachusetts, with a poor soil and unfavorable climate, has a much larger return from agriculture per acre than some States richer in soil and more favored by climate.

Immigration is a new question to the South, but the thoughtful men of that section realize its importance, and Bureaux have and are being organized in the Southern States. Mr. Jefferson Davis, of Mississippi, stated in a recent interview that he looked upon immigration as the future hope of the South. Senator Morgan, of Alabama, in a recent article, says:*

"Alabama and her sister States are suffering serious detriment from this condition of their population, which has deprived them of the benefit of an equal chance for a healthy growth, and of the wealth that comes from industrial activity and skill of the million of white people who annually seek homes in the United States from abroad, nearly all of whom pour into the North and West."

I could multiply evidence like the above from the leading men in the South. I know from contact with the people of this State, and from the many letters received on this subject, that they are alive to the need of such an immigration as is now coming into Kentucky, and they desire that many more such people will come among us. There linger yet, however feebly, a few fallacies which have been taught respecting population, which I think proper to notice in this connection: (1.) That population is increasing too rapidly for the general good of the country. (2.) That the increased population will have deteriorating tendencies on the native morals and institutions of our country.

* "Movements of Population in Alabama and their Results." *Agricultural Review*, January, 1884, p. 9.

So convinced am I that the truth of the above propositions is not borne out by facts, that at the risk of being somewhat tedious, I wish to state a few facts bearing on these subjects. When we see, by the returns of the last Census, that, if the entire population of the United States was placed in the State of Texas, the population of Texas would not be so dense as is the population of France, Belgium, or Holland, the three countries in Europe where there is most universal prosperity among the masses, and not so dense as is the population of the State of Massachusetts, where there is the largest amount of wealth per capita of any State in the Union, we may dismiss, for the present, our fears of over-population. Other conditions than density of population conduce to poverty; and it can be shown beyond question that increase in population has been attended with an increase in general well-being. Take Great Britain, for example, where, with an increase of population, there has been an increase of wealth, and a decrease in pauperism and crime. In 1840 the population was 26,487,026, and the number of convictions for crime 20,776. In 1880 the population had increased to 34,468,552, and the convictions for crime had decreased to 15,643. In 1849 the population was 27,669,574, and the number of paupers of all classes was 934,419, whilst in 1881, with the population of 34,862,466, the number of paupers was 1,013,891. There was nearly double the number of adult, able-bodied paupers in 1849 as in 1880. In 1840 the foreign trade of the United Kingdom amounted to £6 gs. 11½d. per head of the population, and in 1878 it amounted to £18 3s. 6d. per head. The greatly improved condition of the working classes of the country is shown by the following table of consumption per head of the population in the United Kingdom of the following articles:

	1840.	1878.
Tea, consumption per head.	1.22	4.60
Sugar, consumption per head.	15.20	48.56
Rice, consumption per head.	0.90	7.50
Tobacco, consumption per head.	0.86	1.45

In 1843 the total capital of the country was reckoned at £3,880,000,000, and in 1875 it was reckoned at £8,500,000,000. Thus the wealth has increased faster than the population. The increase of population has brought increase of wealth and an improved condition of the poorer classes. That the condition of the poor could be improved in Great Britain* none will deny, but the improvement will come from the aboli-

tion of the feudal land laws of that country, and from an increase in thrift and temperance among the laboring population. At present 2,184 persons hold 38,875,522 acres, or nearly 3,000,000 more than half the area of the United Kingdom; and 10,888 persons hold nearly 52,000,000 of acres, or within 20,000,000 of the total area of the United Kingdom.

Ireland is triumphantly cited by the advocates of the above mentioned fallacies respecting population as an example of poverty from over-population. Ireland is not over-populated, having, by last returns, only 158 persons per square mile, whilst Belgium, just across the channel, with a soil naturally inferior to the soil of Ireland, supports in plenty a population of 461 per square mile. It is a noteworthy fact that in the District of Munster, where the population is but 141.6 per square mile, the percentage of emigration is 2.3, and of pauperism, 13 per cent., whilst in the district of Ulster, with a population of 199.5 per square mile, the number of emigrants is but 0.2 per cent, and the number of paupers 6.1 per cent.*

We must look to other causes than over-population for the poverty in Ireland. The returns for 1876 show that nearly one half of the whole acreage of Ireland is owned by 749 proprietors, and that more than four-fifths of the land is possessed by 3,750 proprietors, many of them being absentees.

Let us examine the condition of the people in a few of those countries where the feudal land laws have given place in whole or in part to the accepted "free trade in land" requirements of the age, and we will find that an increase in agricultural population has brought increased prosperity to all.

France has an area of 204,147 English square miles, and a population, according to the census of 1876, of 36,905,788, or 181 persons to the square mile. The feudal land laws were abolished after the French Revolution, and the number of land-owners has steadily increased. By the last return which I have been enabled to procure, the rural population amounted to 18,513,321, or 52.71 per cent. of the whole population. Of the above number, 9,097,758 were land-owners living on their estates; 4,570,068 farmers or tenants; 378,827 gardeners and nurserymen; the remainder consisting of laborers, servants, etc. It is well known that there is little emigration from France, and that the

* In this connection it is interesting to note that the largest percentage under grass is in Munster, and the smallest in Ulster.

peasantry of France own a large part of the French bonds. Leslie,* after describing the prosperous condition of the peasantry of France, says, quoting a communication from M. de Lavergne:

“The best cultivation in France is, on the whole, that of the peasant proprietors, and the subdivision of the soil makes perpetual progress. * * The market price of land has quadrupled in ten years. But for the duty on property changing hands, and the still heavier burden of conscription, the prosperity of the rural population of France would be great. It advances in spite of everything.’ * * * * It follows that the subdivision of the French soil, which has been the subject of sincere regret and pity on the part of many eminent English writers and speakers, as well as of much ignorant contempt on the part of prejudiced politicians, is really both a cause and an effect of the increased wealth of every class of the population—the seller and the buyer of land, the land owner, the farmer, and the laborer, the country and the town. Instead of being, as has been supposed, a cause of low wages, it has been a consequence of high wages, which have enabled the laborer to become a land buyer. Instead of diminishing agricultural capital, as many English agriculturists urge, it is, in the language of Adam Smith, both cause and effect of ‘the frugality and good conduct, the uniform, constant, and uninterrupted effort of every man to better his own condition, from which the public as well as private opulence is derived, and which is frequently powerful enough to maintain the natural tendencies of things towards improvement, in spite both of the extravagance of government and the greatest errors of administration.’ * * * The amount of debt on the peasant properties of France has been enormously exaggerated. M. de Lavergne estimates it at five per cent. as an average on their total value; and the marked improvement in the food, clothing, lodging, and appearance of the whole rural population is of itself unmistakable evidence that they are not an impoverished class, but, on the contrary, are rapidly rising in the economic and social scale.”

A United States Consular Report to the Department of State under a recent date, says:

“For these reasons, the work people of France, with as little remuneration and as scanty fare as those of almost any other country, are the happiest and most contented labor population in Europe. * * * As a general rule, viewed from a purely material stand-point, the French farmer, small as well as great proprietor, is better off than his brother agriculturist in America.”

The Netherlands have no advantages of soil excepting what has been added by long years of patient industry. Much of the land has been reclaimed from the sea. Forty-five per cent. of the area consists of poor and partially reclaimed sand, and eighteen per cent. is covered with fens. Yet, on an area of 12,731 square miles—less than one third the

size of Kentucky is a population of near four millions (3,981,877 by the Census of 1871) of people, as prosperous as any on the earth. Here is universal prosperity, with a population amounting to 302 per square mile. In North Holland the population is 609, and in South Holland 653 per square mile. Says a recent Consular report to the United States Department of State:

“There perhaps cannot be found elsewhere an equal number, occupying a similar area, in which a larger amount of wealth has been accumulated by individual ownership, and in which the operatives or producers are more contented, and in possession of more of the ordinary needs of life, and less embarrassed by debt. * * * Each individual appears to possess the largest possible personal liberty; the people are more than usually good-humored, kind, and courteous. There is a very noticeable absence of the rougher element that is conspicuous in some countries. * * * Suffice to say, that within the range of my observations, the inhabitants, as a whole, of no country appear more prosperous, more comfortable, or more contented. The prices of nearly all commodities are placed upon their merits without artificial props, and the markets of all the world are accessible for the introduction of whatever may be cheapest and most needed.”

I might multiply evidences like the above; but the great prosperity of the Netherlands is too well known to require argument. Density of population has certainly not been detrimental to that country. The population of Kentucky must exceed twelve millions before it is as dense as is the population of Holland—the country in Europe of most universal prosperity.

Belgium has a population of 461 per square mile—as much as 600 per square mile in East Flanders and Brabant. The conditions are not so favorable as in Holland, as there is a larger percentage of the tenant or rent-paying class (43 per cent. owners, and 57 per cent. tenants), but the number of land-owners is very large, and the prosperity of the country is great. As this is the densest population in Europe (with the exception of the Channel Islands), I have been at some pains to collect information respecting the condition of the rural population. Much of the soil of Belgium was originally very poor—barren sand dunes—but it has been brought to a state of great fertility. The average rent of land in Flanders is 100 francs per Hectare (\$8 per acre), and the value or selling price varies from 3,500 francs to 4,000 francs (from \$280 to \$340 per acre). Rents and selling prices have doubled since 1830. There is no emigration from Belgium. From the last census which I have seen, the immigration into Belgium was 15,000, and the emigration

* T. E. Cliff, Leslie's, "Land System of France."

8,000, and only a small proportion of the latter were natives of Belgium. Of the peasantry, Robt. Scott Burn says:*

"The clothing of these men was in every respect good and comfortable—far superior to that worn by our laborers; the fineness and purity of the shirts worn by them was something remarkable. In the districts where the *petite* culture is carried out, the same signs of material comfort are observable. Once, and only once, did we see, during all our wanderings in Flanders, both last year and this, a child with ragged clothes; and rarely in the rural districts are you solicited for alms. None of the signs of squalid poverty, which too often disgrace our rural villages and hamlets, are met with. * * * Drunkenness is very rare, and the utmost frugality and economy are practiced by all."

Laveleye shows† conclusively that, were all the tenant farmers of Flanders to become possessed of the fee-simple of their lands, their condition would be greatly improved. He also proves* that, in soil, climate, and natural advantages, Ireland has greatly the advantage over Belgium, and that, with the same subdivision of land, the same agricultural traditions, and careful tillage, Ireland would support in comfort and plenty as large a population as Belgium. Belgium, with an area of but 11,373 square miles, has a system of roads second only in excellence and extent to those of England, and up to 1873 the government had expended £14,451,491 on railways; £648,033 are given annually to the public schools: colleges, museums, extensive libraries, art galleries, well endowed hospitals, and charitable institutions are numerous.

Switzerland is very densely populated, and, owing to the large area of unproductive mountain land, the tillable land is very much subdivided. Yet an excellent authority says:‡

"It is almost superfluous to state that Switzerland is a land of small proprietors, the law of equal division being heartily supported by custom. According to Mr. Mackenzie's report, the quantity of land usually held by each varies from six to twelve acres—small lots held together and the larger intersected by other properties; yet, instead of being pauperized by subdivision, the Swiss are proverbial for successful enterprise both at home and abroad. It is, indeed, difficult to say whether the purely agricultural peasantry of Switzerland, or the operative classes living on their own little freeholds in the manufacturing districts, offer the more remarkable example of industry and thrift, intelligence and comfort, widely diffused through a whole community. The evidence of this is too overwhelming and too patent to escape

the attention even of ordinary travelers, and it may safely be affirmed, that, if Swiss habits and institutions could be transplanted into England, agricultural distress would almost cease to be possible."

I cannot refrain from giving, as an example of dense population thriving by a perfect agricultural system, the Channel Islands. The agriculture of these Islands must rank above that of any other country of which I have any knowledge. On a total area of 50,000 acres, of which only 37,000 acres are capable of cultivation, there is a population of 90,000, equal to 1,154 per square mile. A large percentage of the population is engaged in agriculture—estimated at one cultivator to every four acres in Jersey and Guernsey. Land is more valuable than elsewhere in Europe. £200 (\$1,000) is as commonly given in Jersey as £50 in England. Rents range from £4 per acre for poor land to £10 and £12 per acre for good land. Not only do these Islands support their own crowded population in much greater comfort than is enjoyed by the mass of Englishmen, but they supply for exportation, out of their surplus productions, shiploads of vegetables, fruits, butter, and cattle for breeding.* Here is the densest agricultural population in Europe, and the most universal prosperity among all classes.

I have used for comparison those countries having the densest population, but at the same time, with land-laws approximating those of the United States. I have referred mainly to the condition of the rural population, and not to the condition of the population in overcrowded cities; for it is to the bringing of agriculturists and tillers of the soil to Kentucky that the efforts of the Immigration Bureau should be directed. I believe that a study of existing conditions, in this country and in Europe, will convince any one that, with a just land system, a dense agricultural population adds to the value of human existence by making accessible, even to the poorest, schools and churches, libraries and museums, and other blessings of a high civilization, not obtainable, even by the rich, in a sparsely populated region. But for the burdensome public debts entailed by long wars upon the peoples of Europe, the drafts upon the industrial population by the large standing armies, and the unjust land systems yet remaining in some countries, poverty might be banished from all European States, and no complaints of an overcrowded population would be heard.

We have in our own country abundant data from which comparisons may be drawn respecting the advantages or disadvantages of density of

* "Notes of an Agricultural Tour in Belgium, Holland, and the Rhine." (Page 176.)

† "The Land System of Belgium and Holland," by Emile de Laveleye.

‡ "English Land and English Landlords," by the Hon. Geo. C. Brodric, page 317.

* The excellent husbandry and general well-being of these Islands is well described in "A Farmer's Vacation," by Col. Geo. E. Waring, jr.

population. I select for this purpose Virginia and Massachusetts, because those States were colonized about the same time, both situated upon the sea-coast, and they began the race for supremacy with equal chances, the physical conditions being largely to the advantage of the former. Virginia has the grandest harbor on the Atlantic; navigable rivers penetrate to the center of the State; coal and iron ores are in abundance. Massachusetts has no coal, but little iron ore, and no navigable rivers. The water-powers of Virginia equal those of Massachusetts, and the soil and climate are greatly superior. Virginia has certainly the advantage of location. The center of the population of the United States has always remained nearer the latitude of Virginia, and that State is nearer the great valleys of the Ohio and Mississippi. Virginia, from causes not necessary here to mention, did not encourage immigration, and a system of agriculture was adopted which induced large plantations and discouraged the increase of small holdings, and the increase of population.

The following table, compiled from the last Census, gives the present condition of these two States:

	Massachusetts.	Virginia.
Area in square miles	7,800	38,809
Population	1,783,012	1,512,809
Population per square mile	239	39
Value of real estate.	\$1,111,160,072	\$233,601,599
Value of personal property	473,596,730	74,853,536
Total valuation.	\$1,584,756,802	\$308,455,135
Wealth per square mile	\$203,174	\$7,920
Wealth per capita.	\$939	\$203

It may be urged that one is an agricultural and the other a manufacturing State; yet the value of the agricultural products per square mile (by the last Census) was, in Virginia, \$1,178, and in Massachusetts \$3,097.

The population-supporting capacity of America is great beyond our conception, and centuries must elapse before this continent can receive its just share of the population of the globe. Brazil, for instance, is about as large as Europe, and has a capacity to support a larger population than Europe, yet the population of Brazil is only three to the square mile. Charles Maclaren, in his able work on America, makes a careful calculation, based on the soil and climatic conditions (eliminat-

ing a large area unsuited to the sustenance and comfort of man), and arrives at the following conclusions:

"It follows that, if the natural resources of America were fully developed, it would afford sustenance to 3,600,000,000 of inhabitants, a number nearly five times as great as the entire mass of human beings now existing upon the globe!"*

The advances in commercial facilities lessen the dangers from overcrowding in special localities. Holland produces but little wheat, but, with her free commerce, has the cheapest and best supply of bread in the world. The London merchant has upon his table rice from India, tea from China, salmon from Oregon, beef from Texas, bread from Manitoba, and oranges from Florida. The advances in science increase the productive power of man faster than the population increases. America exports more food than when her population was sparse, and the standard of living is higher here than when no food was exported. We may, I think, dismiss the fears of over-population.

There remains to consider the fear that the increased population will have deteriorating tendencies on the native morals and the institutions of our country. Were this true for the whole country, I think Kentucky would be free from this danger owing to distance from seaboard. The most objectionable class of immigrants will remain in the great cities and in large manufacturing centers, and not go to the agricultural districts. This is shown by the census tables of illiteracy. The percentage of illiteracy among the foreign-born in Massachusetts is 19.6, and in Connecticut 18.3 per cent., whilst in Kansas it is but 6.7, and in Ohio 8.4. A large percentage of the foreign-born population in Kentucky was brought into the State to work upon the railways and turnpikes, and naturally came from the poorest laboring class, yet the percentage of illiteracy among the foreign-born population of this State was but 9.7, whilst it was at the same time 22.8 per cent. of the native white population. The great majority of the people now coming to the United States are the thrifty, intelligent, reading, thinking class. The European farmer, on a few acres of land, which he has acquired by the exercise of an intelligence and industry sufficient to make him wealthy in America, learns that he can sell his small holding and with the proceeds transport his family to the United States, and purchase land sufficient to

* This gives a somewhat lower estimated population for the world than is given by most authorities. The density of populations for the five grand divisions of the world, according to estimates I have made from the best authorities to which I have access, is, in Europe, 80 per square mile; in Asia, 46; in Africa, 16; in America, 12, and in the Islands, about 2 per square mile.

insure to himself and to each of his sons a farm much larger than the one left behind. This, and the competition of American farm products, and the desire to escape oppressive military service, the dangers of wars, and the burdensome taxes, are the causes operating to bring to our shores a population better in quality, as a whole, than the population brought to Virginia and the South prior to the Revolution. It is true that a majority of the early colonists of Virginia, Maryland, and the Carolinas sprung from the best English stock—a population so superior as to leave little to be desired; but unfortunately there was another class transported to those colonies, “a class of very poor character, for the most part transported convicts and the scum of the London streets; many were kidnapped as children, as the traffic was lucrative.”*

These were sold into slavery for a term of years, and we may judge of the importance of this element of the population by the numerous laws passed for their government. As early as 1623 laws were passed compelling obedience to masters. They were publicly whipped, branded on the face for certain offenses, could not marry without consent of their masters, time of service was doubled if they ran away, severely punished for resistance to masters: and many other cruel laws were passed in Virginia,† Maryland, and North Carolina to keep this class in proper subjection. I have been at some pains to count from “The Muster of the Inhabitants in Virginia, 1624 '5,”‡ and, at that time, the number of the servile white inhabitants equaled the number of free whites in Virginia. Nor were the free whites all of the most desirable class. Many dissolute adventurers came over in the early days of the Colonies. Of the class above referred to, Bishop Meade said:§

“The lower order of persons in Virginia, in a great measure, sprung from the apprenticed servants and from poor exiled culprits. It is not wonderful that there should be much debasement of character among the poorest population, and that the negroes of the first families should always have considered themselves a more respected class.”

This class—not coming from an agricultural population—having no inherited agricultural thrift, was at a hopeless disadvantage competing

* Lodges' History of the English Colonies in America, page 70.

† See Henning's Virginia Statutes from 1623 to 1748

‡ “The Original Lists of Persons of Quality, Emigrants, Religious Exiles, Political Rebels, Serving Men Sold for a Term of Years, Apprentices, Children Stolen, Maidens Pressed, and others who went from Great Britain to the American Plantations, 1600–1700. From MSS. preserved in the State Paper Department of Her Majesty's Public Record Office, England,” edited by John Camden Hatton.

§ Meade's Old Churches, Ministers, and Families of Virginia, vol. I, page 366.

with organized slave labor directed by superior intelligence, and was, by the nature of the circumstances, forced upon lands where slave labor was less remunerative. With small chance for receiving education, with no such stimulus as would come from being surrounded by thrift, prosperity, and progress, this class has, until within the past few years, had small chance to make progress in the South, and it is possible that the large non-progressive element in the South may be traced to the classes described above.

It is certain that in many districts with which I am acquainted, there exists a class no more advanced in agricultural knowledge than were the farmers at the time of the Revolution. During this time the peasant farmer of Europe has steadily advanced in knowledge, thrift, and morality. For proof of this, it is only necessary to read of the condition of this class in Europe, as depicted by Arthur Young in 1777–'87, and contrast it with the high state of European agriculture of to-day; the numerous agricultural schools, experimental farms, and governmental methods of diffusing agricultural knowledge among the masses. If civilization means anything, then certainly the farmers who bring with them the results of the high civilization of Europe, the accumulated knowledge of centuries, the inherited thrift, the benefits of a perfected school system, and the accumulated earnings of years of toil, should be welcomed among us.

I have already given more space to this subject than I intended, and, consequently, must leave several points untouched. We have by the last report of the Auditor abundant data for proving that, in Kentucky at least, density of population is not attended with the evils dreaded by some. I have taken, for purposes of comparison, four of the largest counties in Kentucky having the smallest population, consequently the sparsest; and four of the smallest counties with a large agricultural population. In the former, with 31,461 people scattered over a wide area, the cost for criminal prosecution was \$32,663, and in the latter, having a population of 53,951, collected on a small area, the costs for criminal prosecution were \$4,268. In the former, there were but 6 foreign-born, and in the latter, 1,791 foreign-born, and a very large per cent. whose immediate ancestors were foreign-born.

I believe that much of the immigration now coming to America represents the more enterprising and the more intelligent of the European peoples; that, as intelligence respecting this country is more diffused, the character of immigration will yet more improve, and that

Kentucky, from peculiarities of soil, climate, and location, will secure the most desirable. I believe an era of prosperity is dawning upon Kentucky and the South, brilliant beyond our most visionary conceptions. The New South, risen from the desolation of war, has again thrown down the gauntlet, and invites her former foes to another contest—a great industrial contest—which, terminate as it may, must inevitably unite the two sections of our country in the never-to-be-severed bonds of brotherhood.

In conclusion, permit me, sir, to thank you for your great interest in the work under my charge, and for your generous coöperation and kindly encouragement.

Respectfully yours,

JOHN R. PROCTER,
State Geologist.

APPENDIX.

LIST OF PUBLICATIONS OF THE BUREAU OF IMMIGRATION.

1. Die Materiellen Verhältnisse und Vortheile für Einwanderer im Staate, Kentucky.
2. To the Farmers of Great Britain and Ireland. On the general excellence of soils of Kentucky, &c.
3. Information for Emigrants. The climate, soils, timbers, &c., of Kentucky, contrasted with those of the Northwest.
4. The same in German.
5. The same in Scandinavian.
6. Der Helvetia-Verein und die Einwanderung. Eine Erklärung des Helvetia-Vereins.
7. Die Schweizer Colonie "Bernstadt," in Laurel County, Kentucky, Nord Amerika.
8. Betrachtungen über Emigration und Colonisation behufs Bildung einer schweizerisch-amerikanischen Colonisations-Gesellschaft im Canton Zürich, 1881.
- 8 a. The same in English.
- 8b. Die Schweizer-Colonie "Bernstadt," in Laurel County, Kentucky, Nord-Amerika.
- 8c. About Immigration.
9. Eine Kurze Beschreibung der Saaner-Kolonie, nahe bei Stanford, in Lincoln County, Kentucky.
10. Christian County, its Advantages and Inducements to Immigrants.
11. Wahrer Bericht über Auswanderung und Ansiedlung, nebst einer genauen Darstellung der beabsichtigten Gründung einer österreichischen Ansiedlung im Staate Kentucky, Vereinigte Staaten von Amerika.
12. A letter concerning the Colony "Bernstadt," from Robert Ueltschi, in German.
13. The same in English.
14. Letter about Colony "Bernstadt," from C. Waegli, in English.
15. The same in German.
16. Thermometric Scale, comparative of Fahrenheit, Celsius and Réaumur.
17. Die neue Kolonie "Alsace," in Boyle county, Kentucky. Beschreibung des innerhalb derselben gewählten Landes zur Gründung einer Oesterreichischen Ansiedlung.
18. Einladung zum Anschluss an eine deutsche Weinbau-Kolonie, unter dem Namen "Strassburg," in der Umgebung von London, Laurel County, Kentucky, Vereinigte Staaten von Nord-Amerika.
19. Die Ansiedlung von "Pine-Hill-Salzburg," in Rockcastle County, Kentucky, Nord-Amerika.

20. Fields for Emigration.
21. Letters describing experiences in the Northwest (German), also German translation of parts of No. 20.
22. Impressions of Kentucky. By an Englishman.
23. Climate of Kentucky compared with that of the Northwestern States and Canada. Facts to be studied by persons seeking homes.
24. Kentucky versus Wisconsin. Wahrheit mit Phantasiebildern verglichen.
25. Kolonie "New Austria" (Neu-Oesterreich).
26. Impressions of Kentucky. By an English editor.
27. Deutsche Weinbau-Kolonie "Strassburg," nahe London, Laurel County, Kentucky, U. S. A.
28. Ueber Reben-Kultur und Wein-Erzeugung (Uebersetzt).
29. Kolonie "Pine-Hill-Salzburg" (First Annual Report).